SUMMARY
DRAFT ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT FOR THE HEADWATERS FOREST ACQUISITION AND PALCO SUSTAINED YIELD PLAN AND HABITAT CONSERVATION PLAN

KEY TERMS:	
CDF	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
Class I stream	fish-bearing
Class II stream	aquatic life but not fish-bearing
Class III stream	ephemeral stream with no aquatic life and not fish-bearing
Clear cut	removing all trees in a designated timber harvest area.
EPA	U.S. Environmental Protection Agency
FWS	U.S. Fish & Wildlife Service
HCP	Habitat Conservation Plan
IA	Implementation Agreement
ITP	Incidental Take Permit
Life of permit	50 years for judging significance
LSH (late seral habitat)	Habitat with trees that average over 24 inches dbh that have begun to develop a multi-storied structure. Corresponds to California Wildlife Habitat Relationships selective harvest removal of less than the total of all standing timber on a stand, according to one or more silvicultural prescriptions (e.g., single tree/group selection).
LTSY (long-term sustained yield)	The volume of timber that may be harvested annually on a site based on the silvicultural prescriptions (growth and yield).
LWD (large woody debris) 1 meter (3 feet).	Any large piece of relatively stable woody material that intrudes into a stream channel, having a diameter of at least 10 centimeters (4 inches) and a length greater than 1 meter.
MMCA	Marbled murrelet conservation area. Those areas identified in the PALCO HCP which would protect the highest quality murrelet habitat from any timber harvest over the life of the ITP.
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
OGR	Old-growth redwood. Trees generally over 200 years old with a diameter over 30 inches.
OGR, uncut	Old-growth redwood in stands that have not been previously harvested. Characterized by multiple canopy layers dominated by trees over 30 inches dbh, with a shrub and herb layer and large numbers of snags and downed logs.
old-growth, residual	Second-growth forest containing a small number of old-growth trees that were left behind during prior timber harvest.
old-growth, uncut	Old growth (redwood or Douglas-fir) that has not been entered for the purpose of salvage logging or other timber harvest.
Residual OGR	Old-growth redwood trees remaining in stands that have been previously harvested. Old growth generally does not form a canopy, and the surrounding forest cover is dominated by second growth.

KEY TERMS:	
RMZ	Riparian Management Zone. Area adjacent to a stream that is managed to maintain both riparian and aquatic functions. See WLPZ.
Selective harvest	Removal of less than the total of all standing timber on a stand, according to one or more silvicultural prescriptions (e.g., single tree/group selection).
Silvicultural prescriptions	The method by which trees are removed from a stand. Includes clearcut, seed tree, shelterwood, single tree/group selection, late seral, and commercial thinning.
Single-tree selection	Individual trees or groups of trees of all ages are removed to create a mosaic of even-aged groups, resulting in a forest with uneven-aged stands, to approximate the conditions found in an uncut forest.
Stormproofing	Upgrading or building roads to specifications which minimize the potential for erosion or washouts where roads cross streams. Includes gravel surfacing to reduce surface erosion; ditch relief culverts [Drainage structure or facility moves water from an inside road ditch to an outside area, this helps prevent ditch erosion and associated sediment transport to streams during storms.], and increased culvert size to pass flow from larger storms and reduce potential for washouts at streamcrossings.
SYP	Sustained yield plan
THP	Timber harvesting plan
WHR	Wildlife Habitat Relationship System as late successional types 5M, 5D, and 6.
WLPZ	Wildlife and lake protection zone

SUMMARY

1. INTRODUCTION—THE PROJECT UNDER CONSIDERATION

This section is a summary of the Draft Environmental Impact Statement and Environmental Impact Report (EIS/EIR)) prepared by the US Fish and Wildlife Service (FWS) and the California Department of Forestry and Fire Protection (CDF) as lead agencies for the Headwaters Forest Acquisition and the PALCO Sustained Yield Plan (SYP) and Habitat Conservation Plan (HCP). The summary highlights the prominent effects of the project and its alternatives. By its nature, the summary abbreviates the extensive analysis and discussion of the main document. The reader should use the summary for an overview of the EIS/EIR and then refer to the main document for a complete discussion.

The Pacific Lumber Company and its wholly owned subsidiaries, Scotia Pacific Company, LLC and Salmon Creek Corporation (hereafter collectively referred to as PALCO) manages forest lands in Humboldt County, California. PALCO's ownership, including lands to be acquired under the Headwaters Agreement, covers approximately 211,000 acres most of this acreage has been used for commercial timber production for as long as 120 years (Figure S-1). The ownership produces primarily redwood and Douglas-fir. Lands next to PALCO property include other large industrial commercial timber operations, smaller commercial timber operations and other private parcels, state and county public parks and reserves, and other government lands. Other uses of private lands include grazing, agriculture, and residential.

PALCO lands lie in the watersheds of the Elk, Van Duzen, Eel, Bear, and Mattole rivers. A major portion of the ownership lies in the watershed of Yager Creek, a tributary to the Van Duzen.

A 5,625-acre portion of PALCO's property includes the Headwaters and Elk Head Springs forests which are the largest remaining grouping of uncut old-growth redwoods on private land. This area is subject to possible public purchase and is collectively referred to as "Headwaters" in this EIS/EIR.

The EIS/EIR also addresses 9,468 acres of land now operated by the Elk River Timber Company. Approximately 1,764 acres of the land would be added to the Headwaters purchase area in order to buffer the old-growth redwood (OGR) on the PALCO portion; the remaining 7,704 acres would go to PALCO as partial payment for the Headwaters.

2. PURPOSE AND NEED FOR ACTION

The Headwaters and other areas of PALCO land provide important habitat for a number of listed endangered or threatened species including the marbled murrelet, a sea bird which nests in old-growth trees, the northern spotted owl, and the coho salmon.

Because PALCO's harvest of old-growth trees would likely result in take of listed species, PALCO desires to obtain incidental take permits (ITPs) from FWS (for marbled murrelet and other wildlife and resident fish) and from the National Marine Fisheries

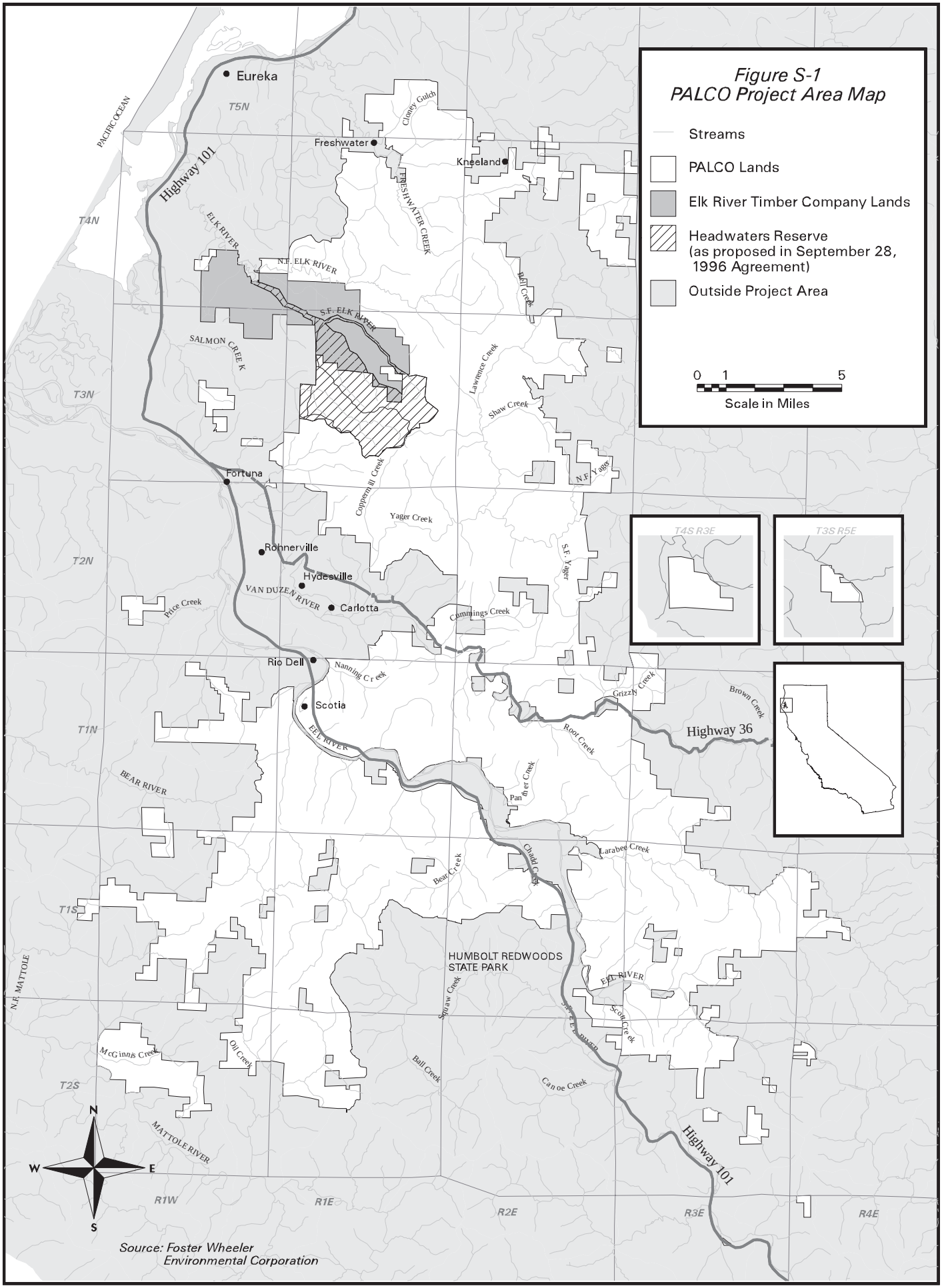


Figure S-1
PALCO Project Area Map
Streams
PALCO Lands
Elk River Timber Company Lands
Headwaters Reserve
(as proposed in September 28, 1996 Agreement)
Outside Project Area
0 1 5
Scale in Miles
Eureka
Freshwater
Kneeland
Fortuna
Rohnerville
Hydesville
Carlotta
Rio Dell
Scotia
Highway 101
Highway 36
PACIFIC OCEAN
ELK RIVER
N.F. ELK RIVER
S.F. ELK RIVER
SALMON CREEK
FRESHWATER CREEK
Clooney Gulch
Ball Creek
Lawrence Creek
Shaw Creek
N.F. Yager
S.F. Yager
Coppermill Creek
Yager Creek
VAN DUZEN RIVER
Price Creek
Cummings Creek
Nanning Creek
EEL RIVER
Grizzly Creek
Brown Creek
Root Creek
Panther Creek
BEAR RIVER
Larabee Creek
Bear Creek
Chadd Creek
HUMBOLT REDWOODS
STATE PARK
Squaw Creek
Scotia Creek
Canoe Creek
Oil Creek
McGinnis Creek
MATTOLE RIVER
N.F. MATTOLE
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

Service (NMFS) (for salmon and steelhead) under Section 10 of the Endangered Species Act (ESA). To obtain an ITP, PALCO must prepare a habitat conservation plan (HCP) that, among other things, minimizes and mitigates take and avoids jeopardy to the ITP's covered species. CDFG also reviews the conservation measures in the HCP that relate to state-listed species and other covered species.

3. PROCESS

Agreements and Legislation

The proposed federal and state actions are under the auspices of a number of agreements and specific legislation.

September 28, 1996, Agreement. An agreement between PALCO and the state and federal governments provided for submission of an HCP to the FWS and NMFS, transfer of Headwaters Forest and other timberlands to public ownership in exchange for property and other assets, and approval of a SYP by CDF.

1997 Federal Legislation. Subsequent federal legislation (October 1997) appropriated $250 million from the Federal Land and Water Conservation Fund for the purchase of the Headwaters Forest, Elk Head Springs Forest, and Elk River Timber Company property and $10 million for Humboldt County, provided a number of specific conditions were met:

- The FWS and NMFS must issue ITPs to PALCO under Section 10 of the ESA based on a multiple species conservation plan covering PALCO lands.
- An appraisal of the lands to be acquired by the United States must be completed and an opinion of value issued by the Secretary of the Interior to both houses of Congress must be rendered.
- The State of California must approve a SYP covering PALCO lands.
- PALCO must provide adequate provision for public access to the Headwaters Forest and Elk Head Springs Forest lands acquired by the United States and California.
- The State of California must provide a $130 million contribution as the state share of the Headwaters and Elk Head Springs forests, and the Elk River Property.
- PALCO must dismiss its takings lawsuits currently pending against the United States and the State of California.

Pre-Permit Agreement. A pre-permit agreement (February 27, 1998) between MAXXAM, PALCO, and the government addressed conceptual approaches to terrestrial and aquatics habitat conservation strategies to be incorporated into the draft HCP.

ITP Application. In July 1998, PALCO submitted a complete application package for an ITP which included the permit application form, a draft of the HCP, and a draft implementation agreement (IA). PALCO's submittal of the SYP to CDF was coordinated with the HCP. This pending HCP/SYP application and the proposed Headwaters acquisition is the Proposed Action/Proposed Project subject to analysis in the EIS/EIR.

Assembly Bill 1986. The California state legislature passed Assembly Bill 1986 (AB 1986) (August 31, 1998), which approved inclusion of state funds for the Headwaters purchase. This purchase is conditioned on modification to the final HCP to provide protection of the Owl Creek Marbled Murrelet Conservation Area (MMCA) for the life of the permit and a five-year delay in harvest of Grizzly Creek. The legislation includes several provisions intended to strengthen protections for threatened and endangered species. AB 1986 also appropriates up to $80 million to purchase the Owl Creek MMCA and up to $20 million towards the purchase of the Grizzly Creek MMCA, although such purchase would not be a component of the HCP. AB 1986 also

provides $15 million for Humboldt County for economic assistance.

Draft HCP/SYP Application. PALCO's July draft HCP/SYP application has not been modified in response to the provisions of AB 1986, and the July draft remains the Proposed Action/ Proposed Project subject to analysis in the EIS/EIR. However, the draft EIS/EIR includes an assessment of the environmental effects of implementing AB 1986 should the provisions contained in that legislation become part of PALCO's final HCP.

Decisions Informed by this EIS/EIR

Federal Decisions. The FWS and NMFS must decide whether to issue ITPs and sign the implementing agreement. Under Public Law 105-83, the Secretary of the Interior must decide whether the conditions established under that statute have been met to render effective the appropriation for the purchase of the federal share of the Headwaters and Elk Head Springs forests and the Elk River Property, including adequate provision for public access to the acquired lands. If the Secretary determines the conditions have been satisfied, he must decide whether to proceed with the acquisition. If the lands are acquired, it is expected that the Bureau of Land Management (BLM) would be the interior bureau to conduct the land acquisition process. The Secretary has identified BLM as the agency within the Interior Department that would administer the transferred lands on behalf of the federal government if the purchase goes forward. Consistent with Public Law 105-83, a specific management plan would be developed and circulated for public review and comment under a subsequent National Environmental Policy Act (NEPA) process.

State Decisions. CDF must decide whether the SYP is in conformance with the California Forest Practice Rules (FPRs) and if the SYP is not likely to jeopardize the continued existence of any endangered or threatened species listed under the California Endangered Species Act (CESA). Other applicable state laws include the California Streambed Alteration Agreement Process (Fish and Game Code 1603), and California Natural Community Conservation Planning Process (NCCP). The state must also decide which state agency would manage state-acquired lands should a state acquisition go forward.

Scope of Environmental Review

The federal and state actions generally involve three separate types of action: (1) issuance of an ITP based on an HCP, approval of a SYP, and other authorizations; (2) acquisition of property by the federal and state governments; and (3) designation of management agencies by the federal and state governments. The EIS/EIR focuses on these decisions and their potential impacts: the effects of the Headwaters purchase on covered species and implementation of the HCP, as well as the environmental effects of the proposed long-term sustained yield forestry. There are other aspects of PALCO's operation that may be subject to other permits and other environmental review which need not be addressed here.

The FWS—in cooperation with NMFS, BLM, EPA, U.S. Department of Agriculture (USDA), U.S. Forest Service, California Resources Agency, CDF, and California Department of Fish and Game (CDFG)—conducted a joint public scoping process for preparation of the EIS/EIR in accordance with NEPA and California Environmental Quality Act (CEQA) requirements. Six scoping meetings were held throughout California to receive public comments on all aspects of the proposal. About 2,690 written comments and 520 oral comments were received during the formal scoping period. After review and consideration of these comments, the FWS and the other cooperating agencies compiled information necessary to prepare the EIS/EIR.

4. ALTERNATIVES INCLUDING THE PROPOSED ACTION/PROPOSED PROJECT

Proposed Action/Proposed Project

PALCO's proposed HCP/SYP (PALCO, 1998) proposes a variety of activities, specific prescriptions, and mitigation measures related to PALCO's timber management activities.

PALCO seeks to have several of its land management and other activities covered by the HCP and associated ITP with respect to potential take of covered species:

- Timber management
- Road and landing construction, maintenance, and closure
- Near-stream gravel mining
- Commercial rock quarries
- Grazing
- Stream enhancement projects
- Operation of fish rearing facilities
- Scientific surveys and studies
- Recreation

The July HCP proposes three primary conservation strategies:

1) **Old-growth Redwood.** This strategy would establish a series of reserves called marbled murrelet conservation areas (MMCAs), which are large, contiguous areas of second growth and residual old growth surrounding the major remaining stands of uncut old-growth redwood on PALCO land. The MMCAs would remain in PALCO ownership but would be unavailable for harvest for the 50-year life of the permit. The MMCAs would total 8,446 acres, including 1,522 acres of uncut old-growth redwood and 3,174 acres of second growth with significant remnant residual old-growth redwood. As proposed in the July draft HCP, PALCO would have the option to harvest either the Owl Creek or the Grizzly Creek MMCA.

2) **Aquatic Species.** This strategy would establish a set of riparian management zones (RMZs) around streams. The zones would extend out to 170 feet on Class I (fish bearing streams) and out to 100 or 130 feet on Class II (aquatic life but non-fish bearing) streams. The RMZs would include an inner no-cut area and an outer band of selective harvest, with no clear cut allowed. The RMZs would also provide equipment and herbicide exclusions. Sediment impact on streams would be reduced by limitations on wet weather road use, by progressive stormproofing of existing logging roads, and by special harvest restrictions in potentially unstable areas and on steep slopes. PALCO would complete a watershed analysis program to develop watershed-specific restrictions within the first five years following issuance of permits (Appendix E in the EIS/EIR). RMZ widths may change based on watershed analysis, extending to 170 feet on both Class I and II streams.

3) **Silvicultural Practices.** Outside of the MMCAs, the HCP would include silvicultural prescriptions that may favor attainment of mature forest conditions in harvested areas and 300-foot selective harvest buffers on PALCO property adjacent to old-growth redwood in Humboldt Redwoods and Grizzly Creek Redwoods state parks. Additional wildlife protection measures for the northern spotted owl would include a conservation plan to prevent owl populations from falling below a baseline level, best management practices (BMPs) to protect amphibians and reptiles, and minimum requirements for the number of snags and downed logs per acre.

Headwater Forest Purchase

The Proposed Action/Proposed Project includes public purchase of the Headwaters in accord with the agreement. The combined PALCO and Elk River Timber Company lands that would go into the Headwaters Reserve are some 7,503 acres, containing 3,117 acres of uncut old-growth redwood. The public protection of this large area of

uncut old-growth redwood has significant regional benefit to covered species and other environmental values. Protection of Headwaters is an important component of the Proposed Action/Proposed Project, but it is not mitigation for PALCO's proposed HCP/SYP.

Development of Alternatives

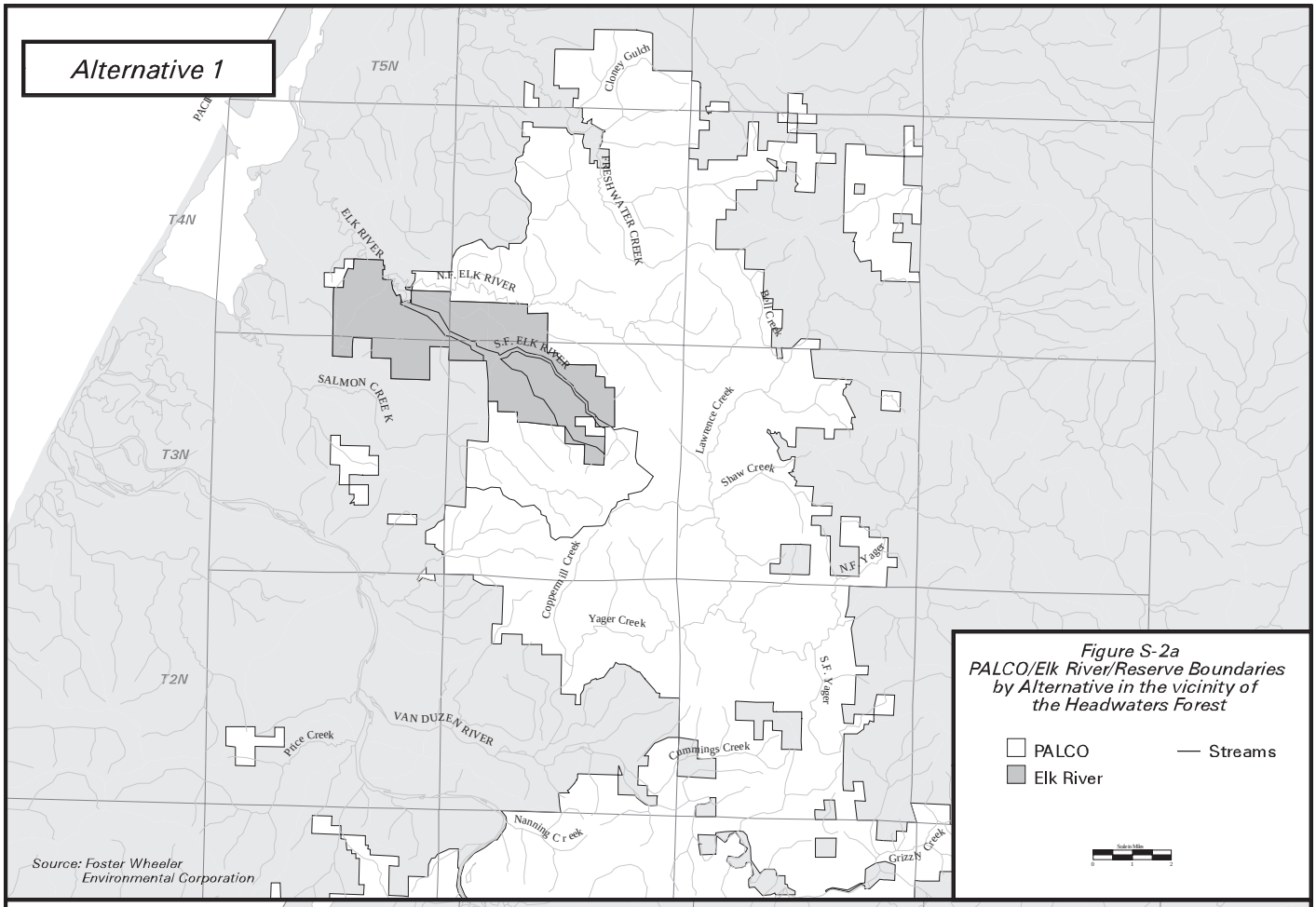
The process used in developing the alternatives for this action included the review and analysis of the purpose and need for the action, the oral and written comments received during scoping, detailed information provided in the HCP and SYP, and the issues described in Chapter 1. Through development of the SYP, numerous alternative timber harvest scenarios were evaluated, and a great many alternatives were formulated to avoid and reduce take of listed species. From these efforts, ten full action alternatives were considered which encompassed the full range of issues and possible combinations of actions. Five of these were not selected for detailed analysis for the reasons listed in Section 2.4. Four action alternatives and one subalternative were carried forward for analysis.

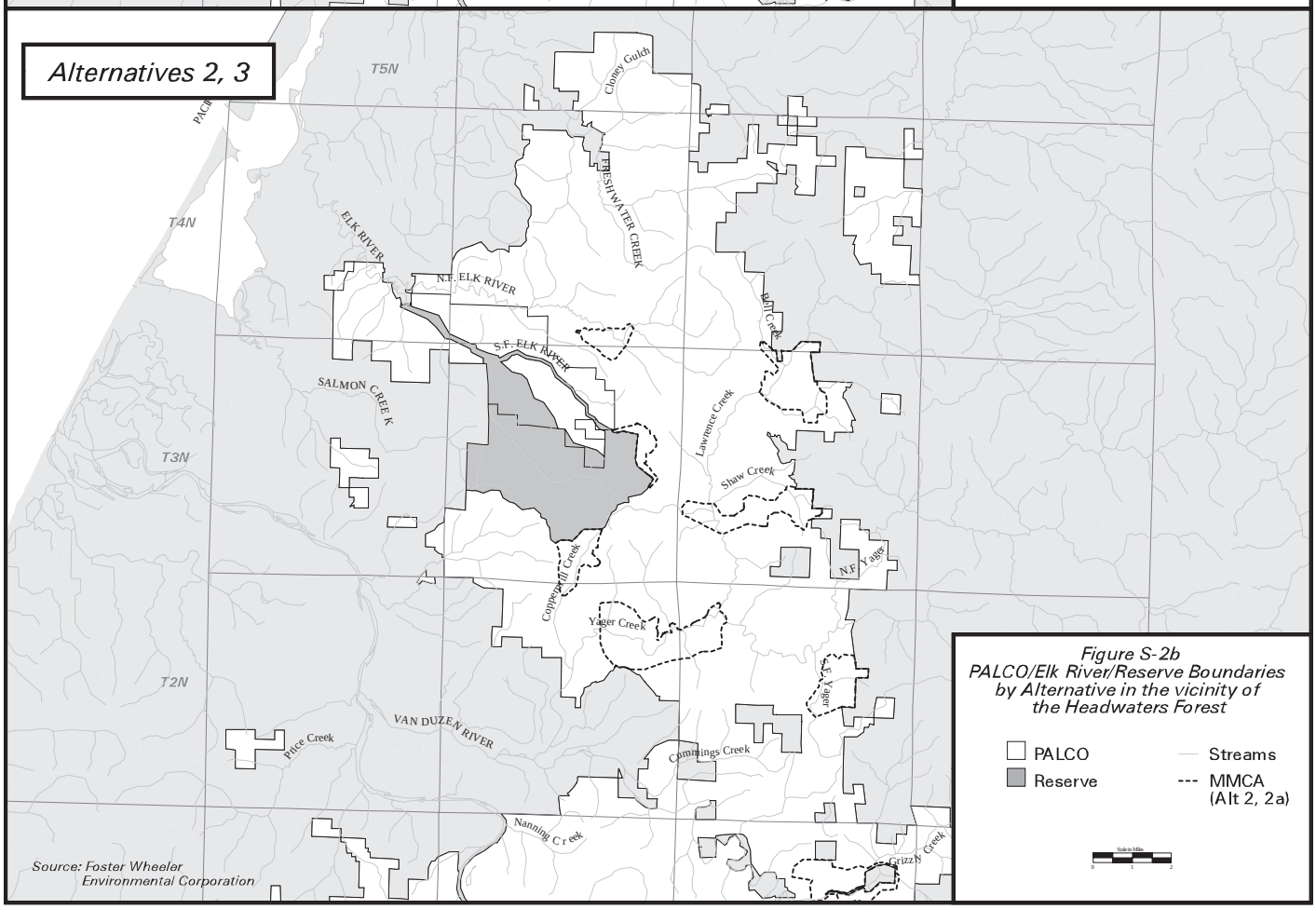
Alternatives Considered In Detail

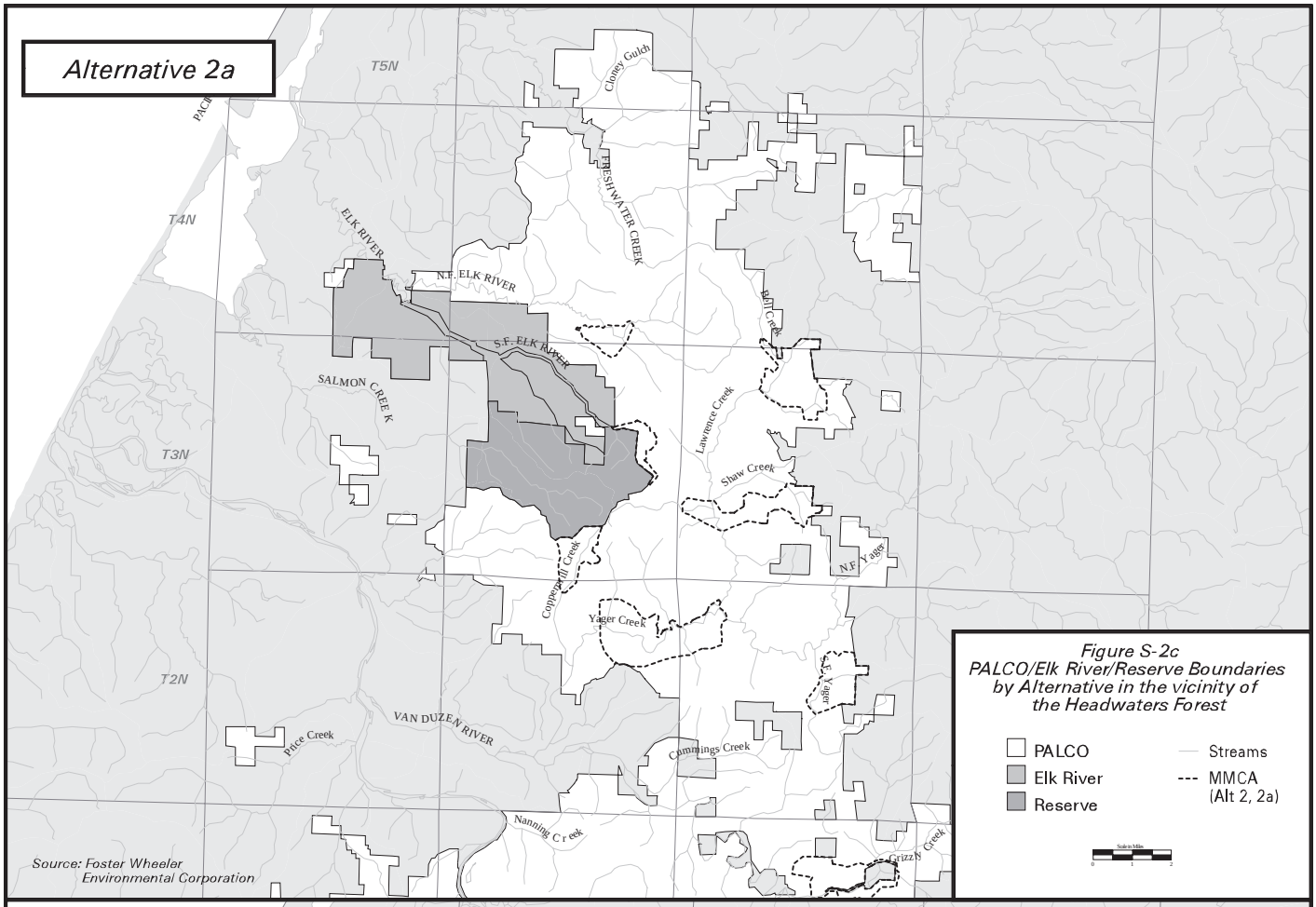
Four alternatives, and one subalternative, are considered in detail in the EIS/EIR (see Figures S-2a, b, c, d). Alternative 1 (No Action/No Project) would not implement an HCP, ITP, SYP, or land acquisition and transfer. The state version of the No Action/No Project alternative contemplates only the short term and would be based on individual THPs that would be evaluated on a case-by-case basis, but which would not permit take of listed species. The federal (NMFS) version of No Action maximizes the amount of land that would be dedicated toward resource conservation by applying either wide riparian buffers or other strategies not described in the EIS that, in combination with smaller buffers, could accomplish the same level of protection. NMFS believes that additional measures beyond the existing state FPR process would have to be applied to avoid take of listed species. NMFS recognizes that the use of wide buffers is only one of many approaches that could be employed to describe a No Action/No Project alternative that would avoid take of listed species. Avoiding take of aquatic species could also be accomplished by other strategies, but wide buffers are a practical way to project how habitat features may change across a landscape over time and allow an impact analysis which can be more readily compared with other alternatives, in accordance with NEPA.

Alternative 2 is the Proposed Action/Proposed Project (applicant's proposed HCP and SYP). Alternative 2a considers the effect of excluding the Elk River Timber Company lands involved in the Headwaters purchase and applying the provisions of the HCP to PALCO's ownership.

Alternatives 3 and 4 represent combinations of additional features (large no-harvest reserve, property-wide selective harvest, buffers around all old-growth and residual redwood and Douglas-fir, and wider riparian buffers around streams) requested by the public in scoping. Alternatives 3 and 4 illustrate additional environmental benefits that would be derived from additional harvest restrictions. The key features of the retained alternatives are shown in Table S-1.


Alternative 1
T5N
T4N
T3N
T2N
Cloney Gulch
FRESHWATER CREEK
ELK RIVER
N.F. ELK RIVER
S.F. ELK RIVER
SALMON CREEK
Ball Creek
Lawrence Creek
Shaw Creek
N.F. Yager
Coppermill Creek
Yager Creek
S.F. Yager
VAN DUZEN RIVER
Price Creek
Cummings Creek
Nanning Creek
Grizzly Creek
Source: Foster Wheeler Environmental Corporation
Figure S-2a
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest
PALCO
Elk River
Streams


Alternatives 2, 3
T5N
T4N
T3N
T2N
Cloney Gulch
FRESHWATER CREEK
ELK RIVER
N.F. ELK RIVER
S.F. ELK RIVER
SALMON CREEK
Ball Creek
Lawrence Creek
Shaw Creek
N.F. Yager
Coppermill Creek
Yager Creek
S.F. Yager
VAN DUZEN RIVER
Price Creek
Cummings Creek
Nanning Creek
Grizzly Creek
Source: Foster Wheeler Environmental Corporation
Figure S-2b
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest
PALCO
Reserve
Streams
MMCA (Alt 2, 2a)


Alternative 2a
T5N
T4N
T3N
T2N
Cloney Gulch
FRESHWATER CREEK
ELK RIVER
N.F. ELK RIVER
S.F. ELK RIVER
SALMON CREEK
Bell Creek
Lawrence Creek
Shaw Creek
N.F. Yager
Coppermill Creek
Yager Creek
S.F. Yager
VAN DUZEN RIVER
Price Creek
Cummings Creek
Nanning Creek
Grizzly Creek
Source: Foster Wheeler Environmental Corporation
Figure S-2c
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest
PALCO
Elk River
Reserve
Streams
MMCA (Alt 2, 2a)

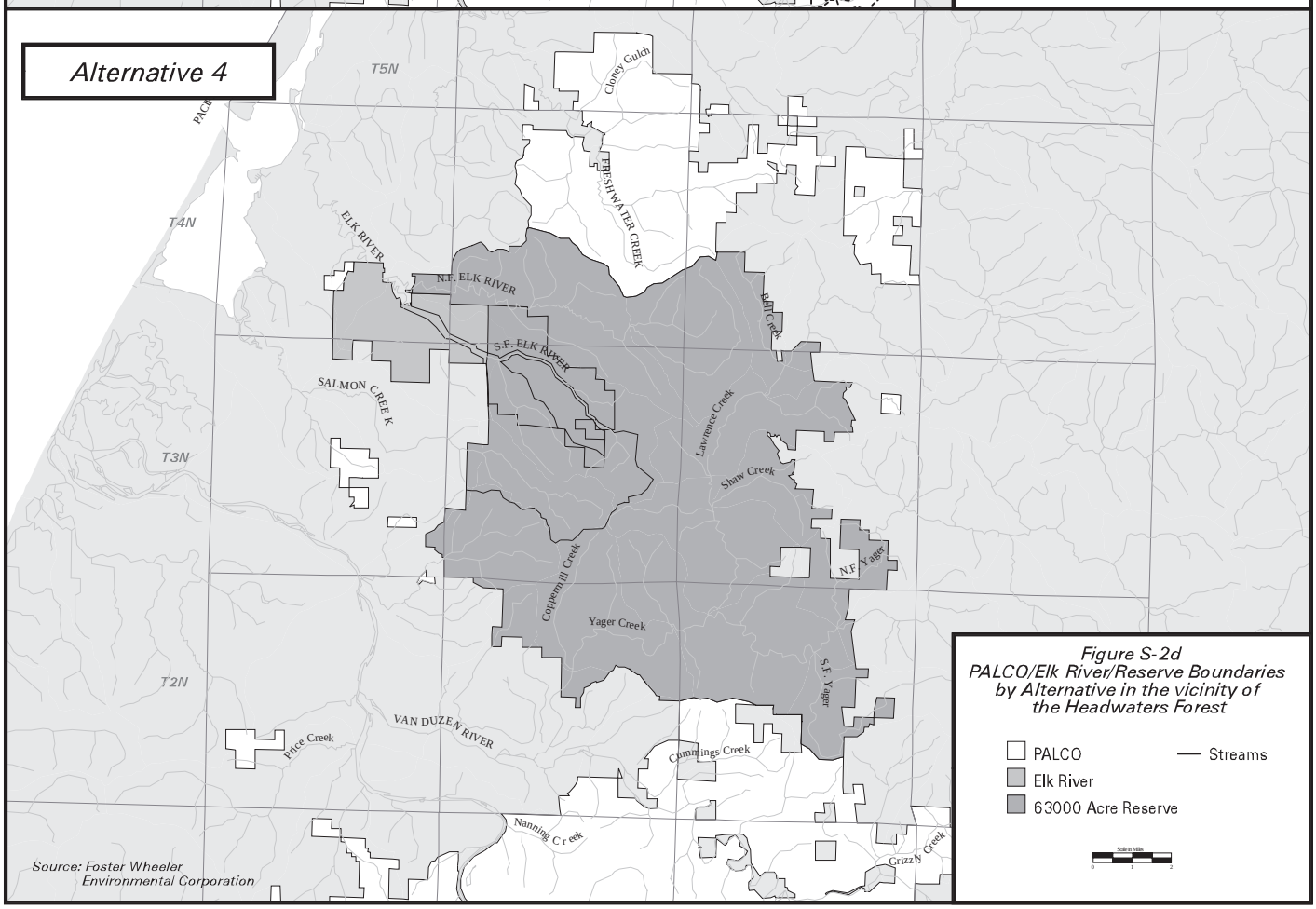

Alternative 4
T5N
T4N
T3N
T2N
Cloney Gulch
FRESHWATER CREEK
ELK RIVER
N.F. ELK RIVER
S.F. ELK RIVER
SALMON CREEK
Bell Creek
Lawrence Creek
Shaw Creek
N.F. Yager
Coppermill Creek
Yager Creek
S.F. Yager
VAN DUZEN RIVER
Price Creek
Cummings Creek
Nanning Creek
Grizzly Creek
Source: Foster Wheeler Environmental Corporation
Figure S-2d
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest
PALCO
Elk River
63000 Acre Reserve
Streams

Table S-1 Key Features Of Alternatives for EIS Analysis* Sheet 1 of 2

Alternative Number	1	2	2a	3	4
Alternative Name	No Action	Proposed Action/Proposed Project	No Elk River Property	Property-wide Selective Harvest	63,000-acre No-Harvest Reserve
Headwaters Forest Public Reserve (acres)	None	7,503	5,739	7,503	63,673
Existing PALCO ownership in Headwaters (acres)	None	5,739	5,739	5,739	58,996
Elk River acreage in Headwaters Reserve (acres)	None	1,764	None	1,764	4,677
Elk River lands transferred to PALCO ownership (acres)	None	7,704	None	7.704	None
Acreage excluded from harvest for murrelet habitat	11,935	7,521	7,521	22,442	4,648
Logging in designated murrelet critical habitat	Allowed only after surveys prove not occupied.	Allowed	Allowed	Not allowed	Allowed
Buffer size around old growth in MMCAs (feet)	0	300	300	600	300
Aquatic protection measures					
Class I streams	170- to 340-foot no-harvest RMZ	170-foot no-harvest RMZ	170-foot no-harvest RMZ [5]	100-foot no-harvest 340-foot total RMZ	170-foot no-harvest RMZ[5]
Class II streams	85- to 170-foot no-harvest RMZ[4]	100-foot no-harvest RMZ[5]	100-foot no-harvest RMZ [5]	70-foot no-harvest 170-foot total RMZ[6]	100-foot no-harvest RMZ [5]
Class III streams	50- to 100-foot no-harvest RMZ[4]	0[5]	0[5]	25-foot no-harvest 100-foot total RMZ[6]	0[5]
Harvest method outside RMZs	Clearcut allowed	Clearcut	Clearcut	Selective harvest	Clearcut
Uncut old-growth redwood at end of 50 years (total acres)	5,140	4,359	4,349	5,140	4,655
Reserve areas	None	3,117	3,117	3,117	4,648
Areas remaining under PALCO	5,140	1,242	1,242	2,023	7
Residual redwood at end of 50 years (total acres)	7,086	3,875	3,875	12,478	6,685
Reserve areas	None	666	666	666	6,472
Areas remaining under PALCO ownership	7,086	3,209	3,209	11,812	213

Table S-1 Key Features of Alternatives for EIS Analysis* Sheet 2 of 2

Alternative Number	1	2	2a	3	4
Total redwood at end of 50 years (old growth and residual) (acres)	12,226	8,234	8,234	17,618	11,340
Non-old-growth LSH at end of 50 yrs (acres)	26,263	18,621	18,195	71,594	41,268
In reserves	0	2,085	537	2,085	21,612
Outside reserves	25,263	16,536	18,642	69,509	19,656

*For a more detailed comparison of alternatives, see Table 2.6-1.

1 Includes all old-growth redwood and about 7,086 acres of residual old growth modeled as occupied murrelet habitat, including both Headwaters and Elk Head Springs forests. Does not include riparian areas outside of old growth.

2 Includes total acreage of MMCAs without Owl Creek MMCA.

3 Includes 600-foot buffers around residual redwood stands.

4 The wider RMZ is the NMFS version used in the EIS for numerical modeling of impacts.

5 Detailed descriptions of the interim and long-term (default) prescriptions for stream buffers are given in Tables 2.5-3a and 2.5-3b.

6 See footnote 7 of Table 2.5-2.

7 LSH not including uncut and residual old-growth redwood or Douglas-fir. See Table 3.9-1.

5. ENVIRONMENTAL EFFECTS—COMPARISON OF ALTERNATIVES

The assessment of the effects of the proposed action and the alternatives is based on thresholds of significance which are defined for each environmental factor and sub-factor in each respective section of the EIS/EIR. The EIS also identifies mitigation measures for all significant adverse environmental impacts which would reduce such impacts to less than significant. The EIS/EIR distinguishes between mitigation included as part of the project (the applicant's proposed HCP/SYP) and additional mitigation recommended by the agencies.

Air Quality

Humboldt County is in attainment for all national air quality standards and for all California standards except for fine particulate matter (PM-10). Forestry contributes to regional PM-10 primarily through vehicle travel on unpaved logging roads, burning forest waste, paved road travel, gravel mining, and road construction. Sources at the mill are subject to permitting by the North Coast Unified Air Quality Management District. The Proposed Project and all alternatives would result in a lower timber harvest than PALCO's harvest in the recent past, so emissions would be similar or less than baseline. Due to aquatic habitat protection measures, more unpaved road travel would be in drier weather, but this would be more than offset by the reduced dust from progressive road graveling and stormproofing. Because emissions are intermittent and geographically dispersed, there would likely be no localized exceedance of air quality standards. Overall PM-10 emissions would be less than baseline emission; therefore, the project and its alternatives would not have a significant cumulative impact on air quality.

Watersheds, Hydrology, and Floodplains

The Proposed Action is expected to produce an overall beneficial net reduction in sedimentation to streams over the life of the permit. The only activity that could cause a significant adverse increase in sedimentation or turbidity would be winter road construction or wet-weather road use.

The mitigation for this would be no winter road construction except as agreed to in advance by PALCO and the agencies. All alternatives would be expected to produce a less-than-significant impact on water quality and hydrology due to proposed measures.

Geology and Mineral Resources/ Soils and Geomorphology

Under No Action (Alternative 1), coarse sediment from road use and construction and timber harvest related mass wasting would remain a moderate potential source of sediment. Landslides along Class III streams could also be a substantial source of coarse sediment, especially during major storm events. Soil productivity effects would be less than significant for all alternatives because of applied silvicultural practices. The Proposed Action (Alternatives 2 and 2a) would reduce both coarse and fine sediment compared to the existing conditions and the No Action alternative. Protective measures include the RMZs on Class I and II streams, the MMCAs, erosion control BMPs, and road stormproofing. Alternative 4 would be similar to Alternative 2, but potential effects within the much larger reserve would be reduced compared to existing conditions or the proposed project. Alternative 3 would have least impact from both fine and coarse sediment erosion over time due to the combined effects of selective harvest, old-growth and residual reserves, and road stormproofing.

Watershed Cumulative Effects

Table S-2 summarizes the relative impact of PALCO activities on each of the major watersheds in the project area, based on the percentage of PALCO ownership of the lands in the watershed, the mix of land uses, and whether the watershed (or particular tributaries) has been identified as impacted for sediment. The table also lists the measures that are or will be in place to reduce sedimentation and improve aquatic habitat conditions on each watershed.

Wetlands and Riparian Lands

Wetlands

The wetland acreage within the project area was determined using National Wetland Inventory (NWI) data. Using this classification system, there are 486 wetland acres within the project area (482 acres in Alternative 2a). The effects of the alternatives on wetland resources were evaluated by comparing the riparian protection measures and the number of acres of wetlands protected in no-harvest areas under each alternative. Sediment delivery from existing road systems was also considered. Alternatives 3 and 4 protect a somewhat larger acreage of wetlands than does the Proposed Action. Alternative 1 protects a lesser or greater amount than the Proposed Action, depending on the range of buffer widths assumed to be implemented under this alternative.

Riparian Zones

Based on the California FPR definition of a wildlife and lake protection zone (WLPZ) there are 18,172 riparian acres (including Elk River property) out of 209,803 total acres (9 percent) of PALCO lands and 39,754 riparian acres out of 949,963 total acres (4 percent) in the six watersheds of which PALCO property is a part (see Table S-3).

Table S-2 Effects of PALCO Activities on Watersheds (Alt 2) and Mitigation

Watershed	% in PALCO Ownership	Land Uses	Prior Impacts to Watershed	Potential Effect of PALCO activities	Other Measures to Reduce Sediment to Streams
Mad River	<5%		NA	Minimal	
Freshwater Creek	56%		Cumulatively impacted by sediment and stream aggradation.	Substantial	TMDLs by 2010. HCP provisions for road and timber management to reduce fine sediment.
Elk River	66%	78% timber production	Cumulatively impacted by sediment and stream aggradation.	Substantial	TMDLs by 2009. HCP provisions (as above). Headwaters Reserve (17 stream miles).
Salmon Creek	less than 5%		N/A	Minimal	HCP provisions (as above).
Eel River	less than 4%		Cumulatively impacted by sediment (Bear Creek, Stitz Creek).	Minimal	HCP provisions (as above). Other CDF provisions.
Van Duzen River	14%	66% timber, 12% grazing, to 21% development	N/A	Small	HCP provisions (as above). FPRs with coho considerations. TMDLs in 1999.
Yager Creek/Lawrence Creek	40%	58% timber, 41% grazing	N/A	Substantial	HCP provisions (as above). FPRs with Coho considerations. TMDLs in 1999.
Bear River	25%	50% timber, 50% grazing	N/A	Substantial	HCP provisions (as above). FPRs with coho considerations.
Mattole River	9%	36% timber, 30% grazing, 15% public lands, 19% rural residential	N/A	Small	Public lands — NW Forest Plan. CDF “no net discharge.” HCP provisions. FPRs with coho considerations. TMDLs by 2002.

Source: see Section 3.6

Table S-3 Summary of Riparian Protection Levels by Alternative *

RIPARIAN FUNCTION	Alt 1	Alt 2 – and Alt 4 47 year default	Alt 2 and Alt 4 — 3 year interim	Alt 3
Stream shade	Class I - complete Class II - high- complete Class III- na	Class I- high Class II -high Class III-na	Class I - high Class II - Moderate Class III - na	Class I - complete Class II - complete Class III -na
Detritus production	Class I - complete Class II - high to complete Class III - high	Class I - high Class II - high Class III - none	Class I - high Class II - high Class III - none	Class I - complete Class II - high to complete Class III - high
Bank stability	Classes I, II, III - complete	Class I - complete Class II - moderate to complete Class III - low to moderate	Class I - complete Class II moderate to high Class III - low to moderate	Classes I, II, III - complete
LWD recruitment	Class I - complete Class II - high to complete Class III - high	Class I - moderate to high Class II - moderate to high Class III - low	Class I - low to moderate Class II - low to moderate Class III - moderate	Class I - high to complete Class II - high to complete Class III - high
Sediment control	Class I - high to complete Class II - moderate to high Class III - high	Class I - high Class II - moderate to high Class III - low to moderate	Class I - high Class II - moderate to high Class III - low to moderate	Class I - complete Class II - complete Class III - high
Microclimate	Class I - moderate to high Class II - moderate to high Class III - high	Class I - low to moderate Class II - low Class III - none	Class I - low to moderate Class II- low Class III- none	Class I - high to complete Class II - moderate to high Class III - low to moderate

*The definitions of “low” “moderate” “high” and “complete” relate to the degree to which the buffer widths and management prescriptions meet the criteria for riparian function protection given in the scientific literature (see Section 3.7).

Based on the analysis given in the EIS (Section 3.7), Alternative 3 provides the highest levels of protection of riparian functions, followed by No Action (Alternative 1); then 2, 2a, and 4 (default); and last, 2, 2a, and 4 (3-year interim prescriptions). However, all levels of riparian zone management provide sufficient protection for aquatic resources in the streams, so all impacts are considered less-than-significant to beneficial.

A significant effect on the riparian system was defined as a substantial reduction in riparian function that limits fish population viability and does not contribute to the attainment of a functioning aquatic ecosystem.

Fish and Aquatic Habitat (including priority fish species)

The threshold of significance for fish and aquatic species habitat is (1) the potential to threaten individual priority fish species or reduce populations and (2) whether the alternative provides or fails to provide improving aquatic habitat conditions or a functioning aquatic ecosystem over the life of the HCP. Adverse effects overlap with water quality, vegetation, and geomorphic factors and include decreased shading and increased summer stream temperatures, pools filling with sediment, destabilization of streambanks, increased stream embeddedness, turbidity, and reduction in LWD recruitment. The distribution of priority fish species (coho and chinook salmon, steelhead, and cutthroat trout) on PALCO lands is shown in Table 3.8-6.

All of the alternatives would provide no-harvest or limited-harvest buffers around fish-bearing streams (see Table S-1) such that aquatic habitat would improve as the forest types within these buffers advanced toward late seral habitat. The net effect was judged to be beneficial for all action alternatives. The net effect of all activities on coho salmon was judged to be beneficial and less than significant for all alternatives.

The essential difference between Alternative 1 and the other alternatives with respect to fish habitat is that a No Action alternative does not include provisions for road management. New and existing roads could then be a source of mass wasting or sediment related to stream crossing or road bed failures. The greatest numbers of road/stream crossings per square mile are found in the Eel Delta, Freshwater and Middle Yager hydrologic units. Any increases in low flows would be minor and short term and probably not beneficial to fish. Under the project alternatives, road-related sediment influx would persist in the short term but would be mitigated in the long term by the stormproofing of 500 miles per decade of roads and other road improvements. Alternative 3 would accelerate the rate of stormproofing, and hence the rate of fish habitat quality improvement, compared with the Proposed Action. Alternative 4 could provide greater improvement of upslope conditions within the 63,000-acre Reserve, compared to the Proposed Action.

Vegetation and Timber Resources

Old-growth Redwood and Douglas-fir. Alternatives 2, 2a, and 3 would conserve identical amounts of uncut and residual redwood in the Headwaters Reserve. Old-growth redwood comprises about 50 percent of the Headwaters and Elk River properties, or 66 percent without the Elk River property. Alternative 1 (No Action) has no reserve, under Alternative 4, the amount of old growth (uncut and residual) is greater than under the Proposed Action (Alternative 2) or Alternative 3. However, considering the size of the Reserve, Alternative 4 conserves little more old-growth redwood than the other alternatives as it is mostly recently cut second growth (see Table S-1).

Total uncut old-growth redwood at the end of 50 years would be slightly greater under Alternative 4 and 18 percent greater under Alternatives 1 and 3 compared to the Proposed Action/Proposed Project. For

Alternative 1 assumes that these areas are still occupied murrelet habitat; otherwise, the acreage would be less than stated. In addition, under Alternative 1, these areas would not be connected by maturing large patches of late seral habitat, but would be isolated from each other and would still not have permanent protection. The uncut old growth under the other alternatives would be part of larger patches of late seral habitat that were increasing in wildlife value. Under Alternatives 2, 2a, and 3, most (about two-thirds) of the uncut old growth would be in the permanent reserves that would not expire at the end of the permit life. Under Alternative 4, all of the uncut old-growth redwood would be in the reserve.

Including residual with uncut redwood, Alternative 3 would preserve twice as much of this habitat as the Proposed Action, Alternative 4—38 percent more, and Alternative 1—48 percent more. The greater acreage under Alternative 1 is a direct result of the prohibition of harvest of any occupied murrelet habitat. Should portions of the habitat become unoccupied, more could be cut and the difference from the Proposed Action would narrow. Moreover, the configuration of the habitat under Alternative 1 would be poor compared to all of the project alternative. Under this project-by-project management scenario, the habitat would be fragmented into smaller, isolated patches rather than large, contiguous patches. Therefore, in spite of the lesser acreage overall, the Proposed Action would improve habitat conditions for marbled murrelets by virtue of providing higher quality habitat with better connectivity.

Under the action alternatives, the loss of old-growth forest is considered a significant effect based primarily on the unique characteristics of, and inability to replace, old-growth forest and the substantial body of public opinion that would consider this loss significant.

The following tables summarize the cumulative impact of old-growth redwood and Douglas-fir harvest under each alternative, in a regional context.

Table S-4 Old-Growth Redwood – Percent of Existing Old-Growth Redwood Remaining in Region to be Harvested by PALCO (acreage does not include reduction for riparian buffers)

REGIONAL CONTEXT	Alt 1– No Action/No Project	Alt 2 - Proposed Action/ Proposed Project	Alt 2a – No Elk River Property	Alt 3 – Property-wide Selective Harvest	Alt 4 – 63,600-acre Reserve
UNCUT OLD-GROWTH REDWOOD GROVES					
Harvested acreage at end of 50 years	0 acres	781 acres	781 acres	0 acres	488 acres
As % of PALCO property uncut old growth—5,139 acres	0 acres	16%	16%	0%	9.4%
As % of Southern Humboldt County uncut old growth—25,449 acres	0 acres	3.2%	3.2%	0%	1.9%
ALL OLD-GROWTH REDWOOD (UNCUT AND RESIDUAL)					
Harvested acreage at end of 50 years	5,392 acres	9,384 acres	9,384 acres	0 acres	6,655 acres
As % of PALCO redwood land—17,618 acres	31%	53%	53%	0%	38%
As % of Southern Humboldt County redwood—41,200 acres	13%	23%	23%	0%	16%

Table S-5 Old-growth Douglas-fir – Uncut and Residual– Percent of Existing Old-growth Douglas-fir Remaining in Region to Be Harvested by PALCO

REGIONAL CONTEXT	Alt 1 – No Action/ No Project	Alt 2 – Proposed Action	Alt 2a – No Elk River Property	Alt 3 – Property-wide Selective Harvest	Alt 4 – 63,000-acre Reserve
Harvested acreage at end of 50 years	4,947 acres	6,018 acres	6,018 acres	0 acres	5,801 acres
As % of PALCO property old-growth Douglas-fir 8,607 acres	57%	70%	70%	0%	67%
As % of Federal lands with old-growth Douglas-fir in Humboldt, Del Norte and western Trinity County* 228,710 acres	2.1%	2.6%	2.6%	0%	2.5%

* Includes BLM Arcata Resource Area and Six Rivers National Forest

Source: Steve Hawks, Paul Roush, BLM Arcata Resource Area; Jeff Mattison, Six Rivers National Forest

The cumulative impact of harvest of high-quality redwood habitat—unentered groves of old growth—is less than significant, since the Proposed Action would harvest only 3.2 percent of the remaining uncut old growth in southern Humboldt County (see Table S-4), which is itself a fraction of the remaining old growth on the north coast. Considering both uncut and residual, the Proposed Action would harvest 53 percent of this habitat on PALCO's lands and 23 percent of the total uncut redwood in southern Humboldt County. This loss is also considered less than significant basis, because the residual habitat that is being cut is lower quality habitat (i.e., patches of second growth containing a few old-growth trees left from prior logging operations).

The regional or cumulative impact of harvest of old-growth Douglas-fir habitat is also less than significant. The 6,018 acres of this habitat harvested under the Proposed Action represents 70 percent of such habitat on PALCO's land, but this is only 2.6 percent of the old-growth Douglas-fir habitat known to be on federal lands in the north coast counties of Humboldt, Del Norte, and western Trinity.

Late Seral Habitat (LSH)

Late seral habitat is defined as areas with trees that average over 24 inches dbh that have begun to develop a multi-storied structure (California Wildlife Habitat Relationships categories 5M, 5D, and 6). LSH includes both redwood- and Douglas-fir-dominated forest stands.

Non-old-growth late seral habitat remaining in the Project Area would be greater under all of the alternatives compared to the Proposed Action. The amount of LSH would be far greater under Alternative 3 than under the Proposed Action (Table S-1) due to the effects of selective harvest and, under Alternative 4, due to the very large no-cut reserve. The almost 8,000 acres more LSH under Alternative 1 (No Action) compared to Alternative 2 (Proposed Action) is an artifact of the very wide no-cut buffers assumed to be in place in the long term under the NMFS version of No Action.

Long-term Sustained Yield

One of the objectives of the FPRs, Section 913.11, is to achieve maximum long-term sustained yield from producing timberlands. CDF measures the effectiveness of the

Table S-6 Comparison of Long-term Sustained Yield Between Alternatives*

LTSY (harvest) million board feet/decade	Alt 1 - No Action/No Project	Alt 2 - Proposed Action	Alt 2a - No Elk River property	Alt 3 - Property-wide Selective Harvest	Alt 4- 63,600-acre Reserve
Decade 1	1,826 mbf	2,335 mbf	2,328 mbf	869 mbf	1,709 mbf
Decade 5	1,100 mbf	1,406 mbf	1,403 mbf	826 mbf	1,055 mbf
Decade 12	1,380 mbf	2,273 mbf	2,280 mbf	1,219 mbf	1,709 mbf
Average harvest per decade	1,380 mbf	1,923 mbf	1,910 mbf	1,120 mbf	1,687 mbf
Percent of Decade 1 proposed action harvest	78%	100%	100%	37%	73%
Percent of average proposed action harvest	72%	100%	99%	58%	88%

* Yield figures include Elk River Timber Company land. See Tables 3.9-6b-and 3.9-6j

proposed SYP according to how well this objective is met, as well as whether the long-term silvicultural practices under the SYP comply with environmental laws and regulations.

Table S-6 shows how well the alternatives meet the objectives of long-term sustained yield compared to the Proposed Action. Alternatives 1 and 4 reduce the first decade harvest by about the same amount (25 percent) and Alternative 3 by 63 percent. The long-term average harvest under Alternative 1 would be similar to the first decade, but for Alternatives 3 and 4 would increase somewhat so that Alternative 4 on the average is 88 percent of the Proposed Action, and Alternative 3 is 58 percent.

Wildlife

Listed Species

Marbled Murrelet

In southern Humboldt County, old-growth redwood is essentially the sole nesting habitat for the marbled murrelet, although it is found in other habitats in other parts of its range. Within redwood forest, old-growth redwood is considered to provide the highest quality habitat because the trees have large limbs that serve as nesting platforms and the stands have relatively closed canopies, which protect young birds from predation and the weather (heat, cold, wind, rain). In contrast, residual redwood stands often have smaller trees with low canopy closure because the second-growth trees between the residual old-growth trees are not high enough (less than 120 feet) to form a continuous canopy with the old-growth trees.

Marbled murrelet habitat conservation is to be provided through MMCAs, use of the late seral prescription single-tree selection within 300 feet of suitable marbled murrelet habitat on adjacent public lands, and other measures. Whether salvage logging in marbled murrelet habitat would be allowed also varies by alternative (Table 2.5-2). In addition, marbled murrelets would also be supported by large amounts of high-quality habitat being protected through public ownership and management of the Headwaters Reserve.

The EIS analysis determined that all alternatives would have a less-than-

significant adverse effect on murrelet populations in the long term. Only Alternative 3 was judged to have a beneficial impact because there would be no timber harvest whatsoever in both designated critical habitat and in all old-growth and residual habitat over the life of the permit. All unentered and residual old growth, as well as 600-foot buffers around each area, would be unavailable for timber harvest. In addition, the acreage of interior forest would increase from about 20,000 to over 31,000 acres, and the connectivity of patches of late seral forest that supports murrelets would improve.

While the Proposed Action (Alternative 2) allows for the harvest of 781 acres of old-growth redwood and 7,594 acres of residual redwood within 10 years, the habitat protection for murrelets is sufficient to reduce the long-term impacts of timber harvest to less-than-significant. The HCP provisions include the protection of 85 percent (4,359 acres) of the high-quality habitat and an additional 3,875 acres of residual redwood habitat that exists on PALCO's property as the Headwaters Reserve and the 12 MMCAs. Residual stands with well-developed second-growth that neighbor old-growth stands offer the highest available potential for habitat improvement within the life of the permit. These areas are incorporated into the proposed MMCAs. In addition, non old-growth areas can be managed to accelerate attainment of mature forest conditions and a 300-foot selective harvest buffer around the Humboldt Redwoods and Grizzly Creek Redwoods state parks where they border PALCO property. Most of the habitat that is allowed to be harvested in both occupied and unoccupied areas is lower-quality habitat in small isolated or linear stands that may also be internally fragmented. Such habitat, even when occupied, may not contribute to the reproductive success of the species because of nest predation.

Under Alternative 1 (No Action/No Project) no take of marbled murrelets would be allowed by law, so no occupied habitat on PALCO's land could be harvested. However, the long-term population effects are uncertain because some currently occupied habitat could become unoccupied if murrelet populations continue to decline. Currently occupied areas which become unoccupied may eventually be subject to timber harvest and salvage logging which would further reduce or eliminate their potential habitat value for murrelets. In addition, since the Headwaters Reserve would not be created, the permanent protection provided to murrelets through public ownership of nearly 3,800 acres of uncut and residual old growth would not exist. Long-term protection of the species on PALCO lands would be less certain overall since it would be subject to political changes which could reduce or eliminate currently protections under the Endangered Species Act.

Alternative 4 would create a 63,673-acre Reserve which includes 4,648 acres of unentered old growth and 6,472 acres of residual redwood that could not be cut in perpetuity. Within this large reserve, the habitat quality and connectivity of the residual areas would continue to improve, and the occupied old growth would be protected. Outside of the reserve, 481 acres of unentered old growth and 6,174 acres of residual redwood could be harvested in the short term, which is less than the allowable amount of redwood harvest under the proposed action. The protection afforded by the reserve area would more than offset the impact of this harvest, leading to an overall less-than-significant effect on murrelet populations. Compared to the proposed action, much of the additional habitat set aside under Alternative 4 is lower quality habitat. The difference in the amount of uncut old-growth redwood in the Reserve is relatively small (4,652 acres compared with 3,117 acres), considering the large difference in overall reserve size. At the end of 50 years, Alternative 4 would provide 87 percent more late seral habitat than would

the proposed action, habitat which could eventually become occupied by murrelets.

Northern Spotted Owl

No alternative would have a long-term significant adverse effect on northern spotted owl populations. Alternative 3 would have a beneficial impact. Alternatives 1 and 4 could cause a short-term decrease, and Alternatives 2 and 2a both a short- and long-term decrease in suitable nesting habitat due to timber harvest activities. However, under Alternatives 2, 2a, and 4, these effects would be mitigated through the implementation of PALCO's Northern Spotted Owl Conservation Plan, which contains measures to ensure that owl populations do not drop below an identified baseline that is substantially higher than minimum recommended populations in the Northern Spotted Owl Recovery Plan. Under Alternative 3, there could be some disturbance of foraging birds due to timber management work, but no take of nest sites. In addition, the timber management prescriptions under Alternative 3 would be expected to provide a substantial increase in owl habitat in the Project Area in the long term.

Wildlife Habitat

The EIS considered impacts of the alternatives to priority vertebrate species, game species, and other species known to be specifically associated with different seral stages of forest development, wetland/riparian habitats, snags and downed logs, cliff/rock outcrop habitats, and other open habitats (see Table 3.10-9). Significance criteria for wildlife species included (1) substantial loss or degradation of occupied habitat that could result in population declines or restriction of a species range and/or (2) take of individual animals.

Under all of the alternatives, wildlife movement corridors would be improved through establishment of the 170-foot-wide RMZ corridors on Class I and 100- to 130-foot wide RMZ corridors on Class II streams within which LSH habitat would be expected to develop or improve. The total acreage protected under Alternative 3 as no-harvest or selective harvest areas would be greater than under Alternatives 2, 2a, and 4.

Priority amphibians and reptiles – Less-than-significant effect for all action alternatives due to RMZs on Class I and II streams. Action alternatives would contain additional protection through other HCP provisions. Alternative 1 would not have the HCP protections and would have a moderate risk of localized sediment delivery to rivers which could degrade breeding habitat.

Priority birds – Less-than-significant effect for all alternatives. Some species (e.g., golden eagle) have a low likelihood of nesting in the Project Area. All project alternatives would contain provisions for nest site protection and snag/downed log protection. Some species would benefit by the increase in LSH habitat under Alternatives 3 and 4. For Alternative 1, the THP consultation process and application of the state FPRs should be sufficient to protect these bird species.

Priority mammals (California wolverine) – Less-than-significant effect. Project area is outside species' known range. Occasional transient would benefit by connectivity of riparian corridors under all alternatives.

Late seral habitat associates – (see Late Seral Habitat)

Snag/downed log associates – Less-than-significant effect from Alternatives 2, 2a, 3, and 4 related to increase and protection of large patches of old growth. Adverse effect under Alternative 1 would be due to increased fragmentation, patch size reduction, reduction of connectivity of LSH, and lack of HCP provisions to protect snags and downed logs.

Neotropical migrant birds – Less-than-significant effect from Alternatives 2, 2a, 3, and 4 related to increase and protection of large patches of old growth. Adverse effect

from Alternative 1 would be due to increased fragmentation, patch size reduction, and reduction of connectivity of LSH and old growth.

Game species – Less-than-significant effect from all alternatives due to connectivity in riparian corridors.

Cliff/rock outcrop associates – Less-than-significant effect for all alternatives. Temporary disturbance or displacement of individuals through noise or degradation of microclimates would be due to timber harvest-related activities. See also separate discussion of Habitat Fragmentation and Connectivity.

Habitat Fragmentation and Connectivity

The threshold of significance for habitat fragmentation and connectivity in the EIS was substantial increase in habitat fragmentation or loss of connectivity due to either (1) decrease in acreage of interior LSH forest or (2) decrease in the amount of LSH in patches greater than 80 acres in size and less than one mile apart (FPR). Alternative 1 (No Action) was found to substantially increase fragmentation. Alternatives 2, 2a, and 4 had a less-than-significant effect, and Alternative 3 had a potentially beneficial effect.

The adverse effect under Alternative 1 is due to the harvest of most remaining LSH on PALCO property in the short term, except within occupied murrelet habitat and the no-harvest RMZs, as well as salvage logging in uncut and residual redwood and Douglas-fir old growth. In the long term, the acreage of interior LSH forest under Alternative 1 (No Action) would decrease by 77 percent (20,011 down to 4,615 acres), with the only remaining interior forest being restricted to occupied marbled murrelet stands. Alternative 2 (Proposed Action) would reduce the acreage of interior LSH forest in the Project Area by a comparable 68 percent in the long term (20,011 down to 6,306 acres), but the effects of this would be mitigated by the development of a very large, contiguous patch of interior LSH containing a high proportion of old-growth redwood within the permanent Headwaters Reserve and about ten stands of LSH 80 acres or larger in the proposed MMCAs. Alternative 4 would also reduce the acreage of interior LSH, but only by 8 percent (20,269 to 18,551 acres). Harvest would remove many large patches of LSH outside the reserve area, but the impacts of this would be mitigated by the development of several very large patches of interior LSH within the permanent 63,600-acre Reserve. In addition, there would be consolidation of about 25 patches of uncut and residual old-growth into one large patch.

Only Alternative 3 would increase the acreage of interior forest from 20,011 up to 31,153 acres, a 56 percent increase. In addition, under Alternative 3, selective harvest throughout the property would substantially improve connectivity of LSH in the long term compared to the harvest prescriptions in the other alternatives. In contrast to Alternative 1, which provides no publicly owned reserves, Alternatives 3 and 4 would also produce equal or greater benefits to habitat connectivity within the reserve areas compared to those described for the proposed action.

Land Use

It can be assumed that with Alternative 1 (No Action) timber production would continue on PALCO lands, although at a decreased level compared to recent years. Other activities that occur on PALCO lands such as grazing, gravel and sand extraction, and use of the camp complex along the North Fork Elk River would also continue. Because the PALCO lands have been designated by Humboldt County as Timber Production, harvest associated with all alternatives would be consistent with the current Humboldt County General Plan, including the Freshwater, Fortuna Area, and Hydesville-Carlotta community plans.

Adjacent and nearby landowners have expressed concerns over timber harvest activities on PALCO lands. These concerns include increases in traffic on local roads from logging trucks (particularly in residential areas), potentially unsafe driving conditions on local roads as a result of the increases in logging truck traffic, and increases in dust and noise from logging operations and logging trucks. Traffic effects are discussed under the Transportation Section. The FPRs require logging to be done so as not to create a nuisance to neighboring land uses. In this case, no residences are close enough to logging operations to experience these impacts. The FPRs can require a 200-foot buffer between logging and park lands, if necessary, to minimize such nuisance effects.

There is also a concern among some local residents that timber harvest on PALCO lands would increase the likelihood of debris slides starting on PALCO lands and affecting nearby property. As discussed in Section 3.6., all alternatives would comply with existing FPRs and HCP prescriptions related to mass wasting and would be implemented with each THP submitted. There would remain a moderate risk of mass wasting events. Due to the low density of residences on private lands next to PALCO lands, the likelihood of residences being affected by mass wasting events would be low.

As with mass wasting, fires originating on PALCO lands potentially could affect adjacent lands. PALCO will follow the FPRs related to fire protection (Article 7, Hazard Control [Burning and Slash] and Article 8, Fire Protection) and site protection (Article 5, Site Preparation). The risk of fire originating on PALCO lands and spreading to neighboring property should, therefore, be low.

Transportation and Traffic

The project and alternatives would not cause significant impacts on levels-of-service on state and county roads. The number of trips and trip length would decrease in the long term under all alternatives, compared to the status quo. There could be increases in logging related traffic during the first decade in certain portions of the ownership (e.g., Freshwater Creek) for the limited periods of time (several weeks) when logging would occur. Under all of the alternatives a substantial number of new logging roads (about 400 miles) would be constructed, some of which may intersect with public roads. The location of these is unknown, but in localized instances these intersections could present sight-distance problems for oncoming traffic encountering logging trucks or insufficient gaps in traffic for logging trucks to safely turn left or right. THPs are reviewed by Caltrans and Humboldt County public works for safety considerations before encroachment permits are granted.

The impacts under any alternative would be proportional to the timber volume (see Table S-6) and to the progression of the logging operation from one area of the ownership to another. Since the impacts of increased logging truck activity in localized areas such as freshwater would be short term and mitigated through the effects of other agency regulations, the transportation impacts under all the alternatives are considered to be less-than-significant.

Economic and Social Environment

The analysis of the economic and social effects on Humboldt County of the proposed action and alternatives included jobs related to timber harvest (logging) and mill work (lumber and wood products), salaries paid to employees and contract workers, tax revenues (federal payment in lieu of tax for the Headwaters Reserve, property taxes, and California timber yield tax) and population changes due to PALCO employment changes. The economic effects of the project compared to its alternatives would be directly related to timber harvest volumes.

Over the past 50 years, the timber harvest in Humboldt County has ranged from a

minimum of about 425 million board feet per year to a maximum of about 1.6 billion board feet in 1959. Humboldt County's share of the north coast region timber harvest has ranged from 42 percent to a high of 71 percent, increasing somewhat in the 1990s (Table 3.13-6). Most timber harvest in Humboldt County (96-98 percent) is on private timberlands. In 1996, there were 21 sawmills and 11 other lumber manufacturing plants in the county (Table 3.13-7). In the last decade, PALCO's contribution has averaged nearly half of the total county timber production (250 million out of 523 million board feet/year) (Table 3.13-8).

Under the Proposed Action, the first decade timber harvest would be about 7 percent lower than the previous decade levels due to the amount of timber unavailable for harvest in set-asides and RMZs. This decreased harvest would be reflected in a projected decreased number of logging jobs (employee or contract), decreased wages and salaries related to the loss of jobs, and decreased timber yield taxes. The annual net effect of federal in lieu tax increases, timber yield tax decreases and local property tax increases or decreases (Table 3.13-15) would be the greatest net loss under Alternative 3, followed by Alternatives 1 and 4. Tax losses under the Proposed Action (Alternative 2) would be about 10 percent of the annual tax loss under Alternative 3 and 20 percent of the loss under Alternatives 1 and 4. The similarity in economic effects between Alternatives 1 and 4 results because similar timber harvest volumes could arise from different forest practices despite differences in the acreages of timberland available to manage. All of the alternatives except Alternative 3 would include harvest of old-growth redwood and Douglas-fir, which would allow PALCO to continue to operate its Mills A and B without retrofit for smaller diameter trees. Under the HCP alternative, $10 million would be transferred to Humboldt County from the congressional authorization of the Headwaters purchase. Table S-7 below compares the effect of the Proposed Action with the alternatives.

Table S-7 Economic Effects

ECONOMIC INDICATOR	Historic Baseline	1 – No Action	2 - Proposed Action	2a - No Elk River Property	3 - Property-wide Selective Harvest	4 - 63,600-acre Reserve
First decade annual timber harvest (thousand board feet)	523,539	445,706	496,558	495,935	349,917	433,935
% of historic harvest rate	100%	68.5%	93.4%	88.6%	34.8%	66%
Job loss (PALCO)[1]	0	1,412	205	519 plus SPI	2,910	1,521
Average Annual Wage and salary loss ($millions)	0	$18.2	$3.9	$6.7	$37.5	$19.6
Annual net tax effect (first 5 years) – $millions	NA	($1.09)	($.2)	($.4)	($2.25)	($1.16)
Explanation of economic loss effects	NA	Murrelet no-harvest zones and possible large RMZs	Reserve MMCAs and RMZs	Reserve MMCAS and RMZs	Selective harvest method, reserves, and RMZs	Large reserve and RMZs

[1] Includes both timber-related and lumber and wood products jobs.

Herbicides

Herbicides are used in forestry to increase growing space for desired conifer tree species. All alternatives except Alternative 3 would have continued herbicide use. Under the Proposed HCP, PALCO would only make selective ground application and would not be allowed to use aerial applications. PALCO's expected herbicide use under Alternatives 1, 2, 2a, and 4 would not exceed regulatory levels, cause adverse effects on human health or drinking water quality, or have long-term persistence or bioaccumulation effects. Direct and cumulative impacts would be minimized through the stream buffer zones, adherence to prescribed label restrictions and forest management practices, and use of hand application methods.

Current water quality monitoring does not show measurable levels of herbicide near any of PALCO's ground-based applications, but present monitoring data do not cover Class III ephemeral drainages or some of the streamside environments where there are covered species. The uncertainty in herbicide effect on covered species leads to a determination of potentially significant effect and a recommended implementation of a buffer on Class III drainages with potential modification based on the results of actual monitoring of sensitive areas.

Cultural Resources

The effects on cultural resources would be less-than-significant under all alternatives because all alternatives under the California FPRs and CEQA would require a separate review of site-specific effects for each THP submitted to the state. Approval of the SYP by CDF and the issuance of an ITP by the federal government would not result in the state relinquishing its responsibility to evaluate and, if necessary, mitigate effects to site-specific resources not directly considered in the HCP and SYP. In addition, cumulative benefits may result from bringing currently unknown or undocumented historic or prehistoric resources into the public trust through the acquisition of the Headwaters Reserve.

Visual Resources

The threshold of significance for visual resource impacts is whether timber harvest activities dominate a view from a sensitive viewing area, not whether the activities can be seen. Such effects are evaluated using the U.S. Forest Service visual resource management system. This system assigns each key viewing area a degree of modification based on the visual effect of the timber harvest activity.

Because the timber harvest activities under all of the above alternatives would not result in "unacceptable modification," the visual impacts were judged to be less-than-significant for a timber harvest designated region.

Alternative 3 would have a long-term beneficial effect on visual resources because selective harvest would result in at least 20 percent of PALCO's lands being maintained as late seral forest. The remaining 80 percent would be managed to achieve a multi-layered tree canopy covering at least 60 percent of PALCO lands. Tree canopies of harvest areas would be largely retained. This would prevent views of extents of low vegetation or bare ground for nearby or long-distance viewers. Prior clearcut areas would transform visually into forested sites and then not be clearcut again. The effects of Alternative 4 would largely be the same as Alternative 2 from most of the sensitive viewpoints selected for study because the areas where timber harvest would produce visual impacts on these receptors would not be included in the 63,000-acre Reserve and would produce the same effects as the Proposed Action.

Recreation

The thresholds of significance for impacts on public recreation would include (1) conflict with established recreational uses,

(2) conflict with access to an established recreational area, and (3) substantial degradation of the recreational experience of an area. An additional beneficial effect evaluated in the EIS would be the creation of a new public recreational resource.

Based on these criteria, the EIS determined that none of the alternatives would be significant according to criteria one through three above. The creation of the reserves under Alternatives 2, 2a, 3, and 4 would provide the relative degree of benefit according to the respective reserve sizes. Because the principal purpose of the Headwaters reserve is wildlife and resource protection, vehicle access and public recreation opportunities would be far more limited than at a state or national park.

Roadless Areas, Wilderness Areas, Wild and Scenic Rivers

There are no established thresholds of significance for this issue. All of the action alternatives (in contrast to Alternative 1, No Action) would decommission or remove varying amounts of existing logging roads. An undetermined amount of currently roaded area could become roadless, but might not meet the USFS criteria for roadless areas. Portions of the Eel and Van Duzen rivers have been designated as part of the National Wild and Scenic River System. If the proposed project adheres to the state FPRs through the THP process, this should provide sufficient protection to prevent degradation of these designated areas. Preservation of the Grizzly Creek complex along the Van Duzen River would add about 1.5 miles of land along the river to public protection.

Tribal Trust Resources and other Indian Tribal Issues

The threshold of significance for tribal trust resources is substantial negative impacts to any such resources. The thresholds of significance for effects to traditional cultural properties are the same as the criteria used to evaluate whether a federal agency's actions would have an adverse effect on historic property. This includes a restriction of access to a traditional cultural property. The EIS concluded that there would be no impacts of any of the alternatives that meet the criteria for significance since tribal uses of downstream resources should not be adversely impacted, and no traditional cultural properties are known to exist on the project lands. The tribal interest in acquiring and managing the Headwaters Reserve under an Intertribal land trust has been subsumed into the proposed public trust under the federal Department of the Interior.

AB 1986

Under the HCP, either the Owl Creek or the Grizzly Creek MMCA would be available for harvest. AB 1986 conditions the expenditure of state funds for acquisition of the Headwaters Forest and other lands on the inclusion of several provisions in the final HCP, the Implementation Agreement (IA), and the ITPs intended to strengthen protection for covered species. Should PALCO include those provisions in the final HCP, state monies would be appropriated to the state Wildlife Conservation Board to fund the state's share of the cost of acquiring approximately 7,500 acres of private forest lands, including the Headwaters Forest. Under AB 1986, the Owl Creek MMCA would be protected from harvest for the life of the ITPs and the Grizzly Creek MMCA would be protected for five years from the date of the adoption of the final HCP. AB 1986 also appropriates additional funding for the future opportunity to purchase the Owl Creek and the Grizzly Creek MMCAs; however, such purchases are not a component of the HCP. Any funds remaining from those appropriated for the purchase of the Owl Creek MMCA, could be used to purchase tracts of the Elk River Property and previously unlogged Douglas-fir forest land within the Mattole River watershed.

The state managing agency and management prescriptions are unknown and these acquisitions are somewhat speculative. Considering the legislative intent behind AB 1986, it is assumed that purchased lands would be managed similarly to the Headwaters Reserve. These anticipated acquisitions would protect old-growth and residual redwood stands and some Douglas-fir stands within these tracts in perpetuity.

Air Quality— Implementation of AB 1986 would not substantially change air quality impacts. The potential removal of additional forest land from harvest could reduce fugitive dust associated with road building and truck hauling and reduce the potential for slash and broadcast burning associated with timber harvest. Even though, within the context of entire PALCO ownership, the relatively small acreage involved would not represent a substantial difference, it would make a small contribution towards improving air quality.

Watersheds, Hydrology, and Floodplains; Wetlands and Riparian Lands; Fish and Aquatic Habitat — The acquisition and management of additional forest land would reduce management activities that could adversely affect aquatic habitat, water quality, and coho salmon. Because of the relatively small areas affected, however, this would not represent a substantial difference ownership-wide, but might be a substantial benefit to aquatic habitat, water quality, and coho salmon in localized areas. Property-wide RMZ prescriptions for both Class I and Class II streams would represent a significant benefit to both aquatic habitat and water quality. Property-wide, Class I streams would have a minimum 100-foot no-harvest inner buffer and a minimum 30-foot no-harvest inner buffer for Class II streams, with the remainder of the RMZs selectively harvested as described under the Alternative 2 default strategy (i.e., 170-foot RMZ for Class I streams and 100- to 130-foot RMZs for Class II streams). The Class I RMZ prescriptions would provide higher protection because it would maintain or exceed an 80 percent canopy closure for protection of stream shade and water temperature; provide additional LWD, which would contribute to increasing habitat complexity; provide for a more effective sediment filtration buffer; and increase the protection for steep slopes adjacent to the RMZ. For Class II streams in the interim period, extending the inner buffer from 10 feet to 30 feet would substantially increase the level of protection. The same level of protection, as in the Alternative 2 default strategy would be provided where a 30-foot no-harvest inner band within the RMZ is already prescribed. However, additional protection would be provided for Class II streams where there is less than a 30-foot no-harvest inner band in the RMZ. Class II streams that would have the lesser protection under the proposed HCP are those that would be harvested in the first three years as well as those harvested in the remaining 47 years outside the Humboldt WAA in redwood timber types with slopes less than 50 percent. These buffers would increase the effectiveness of stream shade, water temperature, LWD, sediment filtration, and steep slope protection by the Class II RMZs and would reduce the related risks to water quality, aquatic habitat, and coho salmon. Additionally, the requirement for road-related activities to be no less protective, on balance, than the Interagency January 7, 1998, aquatic strategy, would provide a greater level of protection to aquatic habitat and water quality (than Alternative 2) due to sediment discharge and mass-wasting Based on required watershed analysis, RMZs may extend to 170 feet on both Class I and II streams.

Geology and Minerals— The acquisition and management of additional forest land would preclude the opportunity for sand and gravel and perhaps other mineral extraction; however, in the context of the other available sources on the ownership, this would not represent a substantial difference.

Soils and Geomorphology— The acquisition and management of additional forest land

would preclude the opportunity for road building and timber harvest, thus reducing the areas where the risk of hillslope and road-related mass wasting could occur. Because of the relatively small areas affected, however, this would not represent a substantial difference. Other prescriptions on activities would be the same as the proposed HCP.

Vegetation and Timber Resources (including old growth)— The Owl Creek MMCA would protect the following from harvest: 318 acres of old-growth redwood, 13 acres of old-growth Douglas-fir, 247 acres of residual redwood, and 6 acres of residual Douglas-fir. The Grizzly Creek MMCA would protect the following from harvest: 118 acres of old-growth redwood, 0 acres of old-growth Douglas-fir, 530 acres of residual redwood, and 0 acres of residual Douglas-fir. If both MMCAs were protected it would protect the following from harvest: 436 acres of old-growth redwood, 13 acres of old-growth Douglas-fir, 777 acres of residual redwood, and 6 acres of residual Douglas-fir. The protection of the Owl Creek MMCA would remove about 925 acres from timber production. The protection of the Grizzly Creek MMCA would remove about 993 acres from timber production. This acreage plus the application of Class I and II RMZ no-harvest prescriptions would result in less acreage being available for harvest. The combined effect of land acquisition and additional protections on the landscape could reduce the availability of timber and thus further reduce timber supply in the local area and timber-harvest-related employment. However, protection and management in perpetuity of any acquired lands would protect about 1,213 acres of old-growth and residual redwood and would reduce the risk of loss of rare and uncommon flora associated with commercial timber harvest and commercial timberland management practices. All riparian and wetland habitats within these MMCAs would be protected. Besides the old-growth and residual old-growth redwood and Douglas-fir presented above, there would be an additional 84 acres of late seral forest, 283 acres to mid-successional forest, and 22 acres of grassland protected in the two MMCAs.

Wildlife— The protection of Owl Creek and Grizzly Creek MMCAs would protect many acres of old-growth and residual habitat (see above). In addition, the property-wide RMZ prescriptions could result in more trees remaining in some riparian zones. Less disturbance within the riparian zone could result in more rapid improvement in habitat quality and more quickly achieve fully functioning aquatic conditions, which would be beneficial to amphibians and other species that use the riparian zone and stream habitat. The combined effect of land acquisition and additional protections on the landscape would reduce late seral forest fragmentation, thus enhancing interior forest conditions, reducing edge, and enhancing interior forest connectivity. Additional late seral forest habitat remaining on the landscape would benefit late seral dependent species such as marbled murrelet and northern spotted owl and would also benefit snag-dependent species such as woodpeckers and cavity-nesting species such as Vaux swift. The habitat would also benefit species which rely heavily on downed wood. Retention of interior forest habitat would reduce habitat quality for species favoring openings and edge (e.g., deer and elk); however, edge and open spaces habitats are quite common throughout the PALCO ownership and surrounding landscape.

Land Use— Acquisition and management of these properties would require rezoning by Humboldt County. The land would likely be rezoned from Timber Production to Agricultural Exclusive.

Transportation— The combined effect of land acquisition and additional protections on the landscape could reduce the availability of timber and thus could further reduce timber supply in the local area.

Reductions in timber supply would reduce traffic associated with timber harvest. It is assumed that public access to the state-acquired Owl Creek MMCA lands would be limited because of their location within PALCO property. Access to the Grizzly Creek MMCA would be from the existing state park. Thus it is unlikely there would be any substantial changes in traffic-associated tourist or recreation activities.

Economic and Social Environment— The combined effect of land acquisition and additional protections on the landscape could reduce the availability of timber and thus further reduce timber supply in the local area and related timber harvest employment. Reductions in timber supply would further reduce government revenues generated from timber harvesting, in particular the timber yield tax. However, AB 1986 provides $15 million to Humboldt County for economic assistance.

Herbicides— The combined effect of land acquisition and additional protections on the landscape would reduce the need for application of herbicides and thus likely would reduce the amount of herbicide application on the PALCO ownership. However, considering the relatively small acreage involved, herbicide application would not be substantially different than under the Proposed Action (Alternatives 2 and 2a).

Cultural Resources— The combined effect of land acquisition and additional buffers would reduce the risk that significant historical or archaeological sites would be adversely affected. Additionally, the lands that come into public ownership would protect any unknown resources that occur on them.

Visual Resources— Implementation of AB 1986 would result in forested areas being retained near Grizzly Creek Redwoods State Park along Highway 36. As a result, harvest would not occur in those areas, and the existing visual conditions would be retained. The Owl Creek MMCA would not be visible from public roads or viewing points and thus no effect to visual resources would be expected.

Recreation— It is likely that public access to the state acquired lands in the Owl Creek MMCA could be limited since it would be located within PALCO property. Therefore, there might be limited recreational opportunities from this site. The Grizzly Creek MMCA is located next to Grizzly Creek Redwoods State Park along Highway 36. It is possible that additional recreational opportunities might occur from this site. However, no management direction is indicated in AB 1986, and no determinations on access and use by the public could occur until it is actually acquired.

Roadless, Wilderness, and Wild and Scenic Rivers— The combined effect of land acquisition and additional protections on the landscape would slightly increase roadless areas. There would be no effects on areas designated as Wilderness or Wild and Scenic Rivers.

Tribal Trust Resources— Any tribal trust resources would be enhanced because of the additional protection for aquatic habitat and fish, wildlife habitat and resources, plus the additional lands in public ownership.